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ABSTRACT

This paper presents a newly-revised information technology curriculum and an interdisciplinary curriculum which couples information systems (IS) and computer science. Discussion includes changes in teaching and learning methods; technological developments; partnerships with businesses and educational institutions; a collaborative curriculum framework for computer science and information systems, which includes problem solving, organization and system theory, information technology (database, modeling, and IS development), and information technology (computer hardware, communications, and operating systems); and an outline of the MIS/Computer Science program at Duquesne University (Pittsburgh), which entails receiving dual degrees from the School of Business and College of Liberal Arts. (Contains eight references.) (AEF)

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Information Technology Curricula: Business and Interdisciplinary Perspectives

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Abstract

For the past twenty-five years, much discussion, concern, and controversy have surrounded programs of study designed to prepare students for computer and systems-related careers. Model curricula have been published by professional organizations to serve as guides for higher education. Students at many institutions have tried desperately to understand the difference between computer science and information systems. Recently, the rapidly changing nature of the computing field has further complicated matters. This session will present a newly-revised information systems curriculum as well as an interdisciplinary curriculum which couples information systems and computer science. Opportunity for open discussion and idea sharing will be provided.

Partnerships

Over the past several years, there have been dramatic changes in the way we teach and our students learn. Much has occurred with technology, computers, video projection equipment, and multimedia to alter the traditional learning environment. We now hear much about distance learning via fiber optic network, satellite and video conferencing, and interactive cases on CD-ROM. New paradigms for teaching and learning are emerging, and a great deal of emphasis is being placed on cooperative learning, a learning methodology which actively engages the student in the learning process. Students learn by participating, not by reading, listening, and note-taking. Faculty teams are replacing individual faculty stars. In leading edge schools, it has been said that the role of the faculty member is changing from teacher/ instructor to facilitator/mentor/coach. Schools that continue to ignore the market mandate to modify programs risk losing their brightest faculty and students to their competition.

Business schools in particular have faced unusual challenges since 1989. Nationally, enrollment has plunged in our business schools by up to 35%. Competition for students has become intense at both the undergraduate and graduate levels. Many have opined that if the downward enrollment trend continues, only the strongest business schools will survive. The feeling among many is that educational programs in business must respond to the needs of their customers --- businesses and students in this case. Business schools must strive to understand businesses better, pursue alliances with them, and adopt some of their responses to challenging economic conditions, such as leveraging information technology, flattening the management hierarchy, and developing a more global perspective (Lorange, Executive

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Education, p.36). Academics are being encouraged to find a new balance between teaching and research. Traditionally, academics have turned away from the business world, because it is too scientific. The reward system in academe has primarily rewarded publication on narrow topics in hard to read journals. Academics in business schools are encouraged to underpin their teaching with real-life examples and maintain relevance. Businesses must partner with academe if they wish to keep the pipeline filled with superior management talent (Lorange, p. 39).

According to a study conducted by Mckinsey & Co. for the University of Texas at Austin, six major competencies emerged as significant and warrant consideration during curriculum revision (Lorange, p.39):

1. Cooperation. Working together.
2. Vision. To be a pathfinder able to see niches and possibilities.
3. Global perspective. Itís an open world with no borders.
4. Educability. Learn from our own work and avoid old ways of thinking.
5. Flexibility. Mobilize for change.
6. Resilience. There are no problems or mistakes, just possibilities and opportunities

The accrediting agency for business schools in the United States, the American Assembly of Collegiate Schools of Business (AACSB), dedicated the 1995 Annual Meeting in Minneapolis to the theme of Partnerships. Creating strategic alliances is rapidly becoming one of the most effective means for satisfying customer needs, because in most cases, expertise can be more readily acquired than cultivated (Jacobs, AACSB Program Chair). Ultimately educational programs and educational institutions must arrive at the conclusion that they cannot provide all of the resources necessary to remain competitive in a rapidly-changing environment.

Partnering efforts do not have to be between far-away universities or far-away businesses. At our School of Business Administration at Duquesne University, we have ventured into a number of far-away partnerships with businesses as well as other educational institutions. For instance, we have done student exchange agreements with universities in France, Belgium, Japan, and Colombia in an effort to globalize our offerings. We have done study trips to Japan, Germany, Italy, and Nicaragua. Perhaps our most significant and rewarding partnerships are those that we have forged on our own campus, however. We have had, for some time, a three/three program with our School of Law --- three years in the undergraduate business school and three years in law school. We have also had, for some time, two joint degree programs at the masters level --- MBA/Masters in Nursing and MBA/Masters in Pharmacy.

Within the past year, we have partnered our MIS program with our School of Health Sciences to offer a dual or joint degree in Business/Health Information Sciences. Just as ìtechnology is a hot buzzwordî at the moment so are technology and information systems as applied to health care. This partner program was intended to better utilize both faculty and computer resources on our campus. Students enrolled in either Business or Health Information Sciences will be the real winners as a result of this program.

Dual Degree---MIS & Computer Science

Curriculum development for information systems (IS) began in the early 1970s. IS curricula have reflected many dynamic changes caused by the rapid development of information technology over the past several years. IS curricula have also recognized the need for both an organizational and technical emphasis. Standing alone, neither IS nor Computer Science programs have been able to deliver everything needed.

Organizations such as the Association for Computing Machinery (ACM), Data Processing Management Association (DPMA) and the Academy for Information Systems (AIS) have played a key role in helping to define curriculum for the computer and systems-related professions. In the winter of 1994-95, Longenecker, et.al. reporting in the Journal of Information Systems Education provided a collaborative curriculum framework devised by a joint task force from the above three organizations. The area and sub-area competencies are summarized by the following general curriculum guidelines:

IS 1995 Curriculum Area And Sub-area Designations

A. Fundamentals of Computer Information Systems
   - A.1 IS Literacy
   - A.2 End-User Computing

B. IS Theory and Practice
   - B.1 Systems and Quality
   - B.2 Decision Making
   - B.3 IS Planning
   - B.4 IT and Organizational Systems

C. Information Technology
   - C.1 Computer Hardware
   - C.2 System Software
   - C.3 Telecommunications
   - C.4 Programming
   - C.5 Algorithmic Design

D. Systems Development
   - D.1 Software Development
   - D.2 Database
   - D.3 Systems Analysis and Information System Design
   - D.4 Teams and Interpersonal Relations
   - D.5 Project Management

E. IS Deployment and Management
   - E.1 Support Services
   - E.2 Systems Integration
   - E.3 Management of the IS Function
   - E.4 Information Resource Management

In the same article, Longenecker et.al. also summarized the descriptive characteristics of graduates as a result of the work of the Joint Task Force. These characteristics are presented as follows:

Characteristics of IS 1995 Graduates

Communications

IS graduates must communicate in a variety of settings using oral, written and multimedia techniques.

Problem Solving

A fundamental activity of the IS professional is problem solving. IS professionals must be able to choose from a variety of different problem solving methodologies to analytically formulate a solution.

An IS graduate must think creatively in solving problems.

An IS graduate must be able to work on project teams and use group methods to define and solve problems.

Organization and System Theory

IS professionals must be grounded in the principles of system theory.

An Information System is intimately and inextricably linked with the organization in which it is embedded and which it serves. The information system must be congruent with, and supportive of the strategy, principles, goals and objectives of the organization. Therefore, the IS professional must have sufficient background to understand the functioning of organizations.

IS professionals must understand and be able to function in the multinational and global context of todayfs information dependent organizations.

Information Technology (Database, Modeling, is Development)

IS professionals must understand modeling, measurement, and simulation approaches and methods.

Graduates must function competently at an entry level position. In that respect they must be able to describe and develop Information Systems both personally and in groups which are characterized by the following:

IS provides the info/infra structure - a system of data and information flow and responsibility within the organization.

IS provides direct support for the operational activities of the organization.

IS provides a means of meeting the internal and external reporting requirements of the organization.

IS provides measurements necessary for establishing quality and improvement.

IS provides a historical record of the activities of the organization.

IS provides a strategic weapon to be used to gain competitive advantage.

IS provides the link to external information.

IS provides for more timely development and marketing of products and services.

Information Technology (Computer Hardware, Communications, Operating Systems)

As IS becomes more quantitative and develops additional analytic methods, the IS professional must develop sufficient understanding of relevant software and hardware engineering concepts, and the underlying principles on which the methods are based.

An IS professional must have the ability to apply and work readily with (specify, acquire, configure, install, and operate) central networked and telecommunicating distributed systems; the IS professional must integrate hardware, software and communicating systems into effective organizational solutions.

An IS graduate must adjust rapidly to specific hardware, software and communications environments.

Perhaps one of the more difficult partnerships to forge on our campus has been that between our School of Business Administration and our College of Liberal Arts. Perhaps it is the fact that our faculty think differently, act differently, and place relative importance on different things? In any event, the Computer Science Department and the MIS faculty from the School of Business Administration agreed to venture into a dual degree option which would allow the student to tailor a program of studies from the wide range of courses available from the two curricula.

With the previous information as a framework and with specific requests from students and employers, the MIS faculty and the Computer Science faculty at Duquesne University have decided that the best overall program for the ambitious student can be provided through a partnership. The program requires 144 credits and awards a dual degree. By taking 18 credits per semester for his/her entire collegiate career, a student can complete this program without additional tuition expense as the University flat rate tuition structure permits up to 18 credits per semester. Although specific courses are listed in the outline below, course substitutions tailored to the studentís interests are permitted. The outline of the program is as follows:

University Core - 24 Credits
101 Thinking and Writing Across the Curriculum
102 Imaginative Literature and Critical Writing
109 College Algebra
132 Basic Philosophical Questions
151 Shaping of the Modern World
161 The Arts and the Human Experience
--- Core Theology
--- Core Science

College Core - 27 Credits
--- Language (12 credits)
111 Calculus for Non-Science Students
--- History/Literature (6 credits)
--- Philosophy/Theology (6 credits)

School of Business Core - 36 Credits
182-183 Information Systems I & II
281-284 Quantitative Analysis I & II
214-215 Financial & Managerial Accounting
251 Business Law
331 Finance
361 Management
367 TQM & Operations
371 Marketing
499 Strategic Management

Overlap Courses - 12 Credits
221 Principles of Econ I (University Core & SOB Core)
222 Principles of Econ II (College Core & SOB Core)
368 Ethics/Communication (SOB Core & SOB Core, replacing Communications)
- - - Selected social science course (College Core & SOB Core, replacing Econ 223

Computer Science - 24 Credits
100 Elements of Computer Science
120 Problem Solving with Computers
150 Computer Programming I
210 Computer Programming II
220 Computer Organization and Assembly Language
250 Programming Languages: C
300 Data Structures
325 Operating Systems and Computer Architecture
350 Computers and Humanity
480 Senior Project

MIS Major - 21 Credits
382 Object-Oriented COBOL
383 Powerbuilder/Lotus Notes
385 Client Server Computer Systems
481 Systems Analysis and Design
482 Database Management
483 MIS Project
484 Networks and Telecommunications
Total 144 Credits

As previously stated, students completing this program will receive dual degrees from the School of Business and College of Liberal Arts. Students electing this program stand to benefit in four ways:

1. They receive a broad-based liberal arts education, an invaluable background which many in the corporate community insist must be enhanced.

2. They receive a general business background which will help them to function in todayís dynamic organizational environment.

3. They receive an intensive dose of business applications and systems education from their MIS coursework.

4. They receive technical competency beyond MIS from their Computer Science coursework.

Summary

From the information presented, it should become apparent that the School of Business Administration at Duquesne University is very much in favor of educational partnerships. Partnerships allow for resource sharing; they allow programs to jointly offer something that is not possible on a stand-alone basis. Students are given an opportunity to tailor a program that meets their needs. Faculty collaboration is also a direct benefit of this partnering approach. In the case of the program presented, the student will actually earn a dual degree, albeit at a price. The student must be dedicated, focused, and hardworking to complete the program. Finally, from a business school perspective, it provides an additional option, an option which may serve to enhance competitive position and provide that option which certain lcustomersî may be seeking.

Hopefully, this presentation will generate ideas for other collaborative programs and partnerships. Student choices and student educational preparation can be enhanced tremendously by curricular innovation and change.

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